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Inventors: Crowell, Mike L.
Lindebak, Don R.

QUICK CLAMP AND QUICK RELEASE DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

[001] The present application claims priority to copending US provisional application entitled "Mobile Storage System For Weapons and Weapon Accessories," having serial no. 60/448,650, filed by inventors Mike L. Crowell and Don R. Lindebak on February 18, 2003, which is entirely incorporated herein by reference.

FIELD OF THE INVENTION

[002] The present invention relates generally to clamping devices and, more specifically, to clamping devices with quick clamping and quick releasing capabilities.

BACKGROUND OF THE INVENTION

[003] There are many types of clamping devices. Prior clamping devices have been disclosed in the following United States patents: U.S. Pat. No. 2312955

(E A Camburn), U.S. Pat. No. 2472022 (E C Neal), U.S. Pat. No. 2735323 (T D Phillips), U.S. Pat. No. 2947333 (A L Johnson), U.S. Pat. No. 4057239 (H Hopf et al.), U.S. Pat. No. 4874155 (A S Goul), U.S. Pat. No. 4893801 (R W Flinn), U.S. Pat. No. D334524 (K P Pinkney), U.S. Pat. No. 5217213 (L Lii), U.S. Pat. No. 5282303 (F G Schriever), U.S. Pat. No. 5568916 (R R Gibbons et al.), U.S. Pat. No. D376970 (J Drake), U.S. Pat. No. 5626263 (L Lii), U.S. Pat. No. 5709372 (L Lii), U.S. Pat. No. 5732936 (L Lii). None, however, disclose the aspects of the current invention.

Summary of the Invention

[004] The invention is summarized below only for purposes of introducing embodiments of the invention. The ultimate scope of the invention is to be limited only to the claims that follow the specification.

[005] The invention is incorporated in a clamp that can quickly clamp and release an object between two plates. The invention enables a user to quickly clamp an object with one hand and without the need for mechanical assistance to increase the clamping pressure on the clamped object like a screw clamp or a ratcheting clamp. The invention enables a user to quickly clamp and release a variety of objects including bicycles, tennis rackets, shovels, rakes, fishing rods, shotguns, rifles, flashlights and other objects without damaging those objects in the

clamping process. The clamp can be mounted to a wall, table or other structure to provide a convenient and easy way to store and mount objects.

[006] Generally, the clamp comprises a frame, a sliding plate, two alignment rods, a closing rod, and a rod-locking assembly. Preferably, the frame is a rectangular tube shape having four sides and two tube ends, wherein the first of the four sides (herein, the "first opposing side") projects out from the first tube end in a plane substantially parallel to the first opposing side to form a fixed plate, which acts as one of the two clamping plates. In other words, the fixed plate is connected to the frame near the first tube end and protrudes from the frame.

[007] The sliding plate is housed within the frame and projects outward from the first tube end, preferably in amount equivalent to the amount the fixed plate extends from the first opposing side. The ends of the two alignment rods are connected to the first opposing side and the second of the four sides (herein, the "second opposing side") and positioned roughly perpendicular to the opposing sides. The sliding plate has two holes for the two alignment rods and moves between the first opposing side and the second opposing side along the two alignment rods.

[008] The closing rod is connected to the sliding plate and slidably passes through the second opposing side. It is preferred that the closing rod be substantially parallel to the alignment rods and positioned between the two alignment rods. The rod-locking assembly has at least a first position and a second

position and connects to the closing rod. The first position allows the closing rod to move the sliding plate both toward and away from the fixed plate and the second position allows the closing rod to move the sliding plate only toward the fixed plate. The clamp also includes a releasing spring to move the sliding plate back to the open position upon the release of the rod-locking assembly from the closing rod.

[009] The description of the invention that follows, together with the accompanying drawings, should not be construed as limiting the invention to the example shown and described, because those skilled in the art to which this invention appertains will be able to devise other forms thereof within the ambit of the appended claims.

Brief Description of the Drawings

[010] **FIG. 1** illustrates a preferred embodiment of the clamp **5** with interior elements and mechanisms shown with dotted lines.

[011] **FIG. 1A** illustrates a top view of a preferred embodiment of the clamp **5** without interior elements and mechanisms shown with dotted lines.

[012] **FIG. 2** illustrates a bottom view of the preferred embodiment of the clamp **5** shown in **FIG. 1A**.

[013] **FIG. 3** illustrates a front view of the preferred embodiment of the clamp **5**.

[014] **FIG. 4** illustrates section **4-4** of **FIG. 4**.

[015] **FIG. 5** illustrates a preferred embodiment of the clamp **5** in the open position.

[016] **FIG. 6** illustrates a preferred embodiment of the clamp **5** in the partially closed position.

[017] **FIG. 7** illustrates a preferred embodiment of the clamp **5** in the open position.

[018] **FIG. 8** illustrates an axial view of a preferred embodiment of a rod-locking assembly **40** in the "rod-locked" or second position.

[019] **FIG. 9** illustrates section **9** from **FIG. 8**.

[020] **FIG. 10** illustrates section **10** from **FIG 8**.

[021] **FIG. 11** illustrates an axial view of a preferred embodiment of a rod-locking assembly **40** in the "rod-unlocked" or first position.

[022] **FIG. 12** illustrates section **12** from **FIG. 11**.

[023] **FIG. 13** illustrates section **13** from **FIG. 11**.

[024] **FIG. 14A** illustrates an alternative embodiment of the clamp **5** in the closed position.

[025] **FIG. 14B** illustrates an alternative embodiment of the clamp **5** in a partway-closed position.

[026] **FIG. 14C** illustrates an alternative embodiment of the clamp **5** in the open position.

[027] **FIG. 14D** illustrates an alternative embodiment of the clamp **5** with an optional locking device in the locked position.

[028] **FIG. 14E** illustrates an alternative embodiment of the clamp **5** with an optional locking device in the unlocked position.

[029] **FIG. 15** illustrates a use of the clamp **5** in combination with a platform to store a long barreled gun, such as a shotgun.

Description of Preferred Embodiments

[030] It is to be understood that the descriptions below are merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the detail of construction or design herein shown other than as defined in the appended claims. In this specification, the term "rod-locking collar" refers to any device that can be placed on a rod and locked to prevent the collar from moving along the rod. An example of a preferred rod-locking collar can be found on the website published by Newman Tools, Inc. at www.newmantools.com/gripfast/, which Newman Tools, Inc. offers for sale under the trademark GRIP FAST.

[031] As shown in the attached figures (e.g., **FIGS. 1, 2, 4,** and **8-13**), the clamp **5** generally comprises a frame **10**, a sliding plate **20**, two alignment rods **26**, **28**, a closing rod **32**, and a rod-locking assembly **40**. It is preferred that the frame **10** take the shape of a rectangular tube, having a first opposing side **12**, a second

opposing side **14**, a first tube end **16**, a second tube end **18**, and a fixed plate **24**. Preferably, the fixed plate **24** is an extension of the first opposing side **12** beyond the first tube end **16** of the frame **10**. The fixed plate **24** can be connected to the frame **10** near the first tube end **16** and protrudes from the frame **10** in a plane substantially parallel to the opposing sides **12**, **14** (the first opposing side **12** and the second opposing side **14** are sometimes collectively referred to herein as the "opposing sides"). It is preferred to cast the frame **10** and the fixed plate **24** from metal as one piece. It is also preferred that the frame **10** and fixed plate **24** be approximately 1/8 inch thick.

[032] The first alignment rod **26** and the second alignment rod **28** (the first alignment rod **26** and the second alignment rod **28** are sometimes collectively referred to herein as the "two alignment rods") are connected to the opposing sides **12**, **14** and aligned roughly perpendicular to the opposing sides **12**, **14**. It is preferred that the first opposing side **12** and the second opposing side **14** be substantially parallel to each other.

[033] The sliding plate **20** is oriented in a plane substantially parallel to the fixed plate **24**. The sliding plate **20** has holes for the two alignment rods **26**, **28** that permit the sliding plate **20** to slidably pass over the two alignment rods **26**, **28**. The two holes of the sliding plate **20** should be marginally bigger than the outside diameter of each alignment rod **26**, **28** so that the sliding plate **20** can slide over the

alignment rods. Inserting a flange bushing, preferably from teflon or similar material, into each of the two holes of the sliding plate **20** assists in a smooth sliding of the sliding plate **20** over the alignment rods **26, 28**. It is has been found that using an alignment rod of ¼ inch diameter, a hole in the sliding plate **20** of 5/16 inch diameter, and using a flange busing having a cylindrical wall thickness of 1/16 inch permits the sliding plate **20** to slide but not have too much "play" on the alignment rods **20, 22**.

[034] The sliding plate **20** protrudes through the first tube end **16** in a direction substantially parallel to the fixed plate **24**. The sliding plate **20** should extend past the first tube end **16** to create a gripping surface **52** as shown in **FIG 4**. It is preferred that the gripping surface **52** of the sliding plate **20** be the roughly the same size as the fixed plate **24**. It is optionally preferred that the tip of the sliding plate **20** have a curved end **22** as shown in **FIG. 1**. It is also preferred that the sliding plate **20** be approximately **6** inches long with **3** inches extending beyond the first tube end **16**. Another option is to fasten rubber padding **54** (see e.g., FIG. 2), preferably ribbed rubber padding **54**, to the inside faces of the sliding plate **20** and the fixed plate **24**. A rubber guard **30** can be added along the first tube end to cushion any clamped object from banging against the first tube end **16**. Both the rubber padding **54** and the rubber guard **30** can be glued to the clamp **5**.

[035] The closing rod **32** is connected to the sliding plate **20** between the two alignment rods **26, 28**, preferably at a point substantially equidistant between the two

alignment rods **26**, **28**. The closing rod **32** should be aligned substantially parallel to the alignment rods **26**, **28**. A hole **34** in the second opposing side **14** permits the closing rod **32** to slidably pass through the second opposing side **14**. It is preferred that the hole **34** be marginally bigger than the diameter of the rod-locking clamp **42** to allow the rod-locking clamp **42** to pass through the hole **34** for easier assembly of the clamp **5**.

[036] It is preferred that the rod-locking assembly **40** has a first position **56** and a second position **58**. In the first position **56** (the "rod unlocked position"), the rod-locking assembly **40** permits the closing rod **32** to move the sliding plate **20** in two directions: toward the fixed plate **24** and away from the fixed plate **24**. In the second position **58** (the "rod locked position"), the rod-locking assembly **40** permits the closing rod **32** to move the sliding plate only in one direction: toward the fixed plate **24**.

[037] The rod-locking assembly **40** can be configured in a variety of ways. It is preferred, however, that the rod-locking assembly comprise a rod-locking clamp **42** fixed to the second opposing side **14** and a ring tab **46** attached to the locking clamp for activating the release mechanism of the locking clamp. It is preferred to use a rod-locking clamp having a 5/16-inch rod size sold under the trademark GRIP FAST by Newman Tools, Inc. Additional information regarding the preferred rod-locking clamp can be found in United States Patent No. 4,893,810 (Lee).

[038] The preferred way to fix the rod-locking clamp **42** to the second opposing side **14** is by using a retaining ring **44**. The retaining ring **44** can be added to the rod-locking clamp **42** by scoring a channel around the outside circumference of the rod-locking clamp and snapping in a metal ring to fit in the scored channel. By adding a retaining ring **44** around the outside circumference of the rod-locking clamp **42**, the retaining ring can keep the rod-locking clamp from passing through the closing rod hole **34** when the closing rod **32** is depressed. The retaining ring **44** can be fastened to the second opposing side **14** by any suitable means, such as a screw. Fastening the retaining ring **44** to the second opposing side **14** keeps the rod-locking clamp **42** from moving in any direction.

[039] Rather than fastening the retaining ring **44** to the first opposing side, however, it is preferred to enclose the rod-locking assembly in a housing **70**. By enclosing the rod-locking assembly in a housing **70**, the wall of the housing can be used to keep the retaining ring **44** in contact with the second opposing side **14** by the use of a spacer **48**. It is preferred that the spacer be made of plastic and formed so that it fits over the rod-locking clamp **42** and extends until it touches the third opposing side **72**. In other words, the combination rod-locking clamp **42** and spacer **48** is kept from moving on one side by the retaining ring **44** that bears on the second opposing side **14** and kept from moving on the other side by the third opposing side **72** of the housing **70**.

[040] In the preferred embodiment, the rod-locking clamp **42** is converted from the second position **58** to the first position **56** by the activation of the ring tab **46**. Activation of the ring tab **46** (i.e., moving the ring tab linearly in a direction away from the retaining ring **44**, releases the rod-locking clamp's grip on the closing rod **32**. Without the optional housing **70** (or by leaving an opening in the optional housing **70**), the ring tab **46** can be activated directly by hand. If desired, the ring tab **46** can be activated by mechanical means. There are many ways known in the art to mechanically activate the ring tab **46.** It is preferred, however, to utilize a keyed-locking mechanism **76** as shown in **FIGS. 5**, **6**, and **7** to activate the ring tab **46** and so that not only is the ring tab **46** mechanically activated, but the key-locking mechanism **76** adds the capability of preventing the rod-locking clamp **42** from unintentionally being moved into the second position **58**.

[041] The clamp **5** can optionally include a releasing spring **60**, **62**. The releasing spring **60**, **62** is preferably placed over one or more alignment rods between the fixed plate **24** and the sliding plate **20**. The purpose of the releasing spring is to spring the sliding plate back in the open position when the ring tab **46** is activated (switching the rod-locking assembly from the first position to the second position) in the closed or partially closed position. The releasing spring **60**, **62** provides the "quick-release" effect of the clamp.

[042] An optional example of a rod-locking assembly **40** is illustrated in **FIGS. 14A -14E**. Preferably, the optional rod-locking assembly **80** comprises a locking plate **82** having an aperture through which the closing rod **32** can slide. The nose **84** of the locking plate is pivotably connected to one leg of an angle **86**, with the other leg of the angle **86** being fixed to the second opposing side **14** by a fastening means, preferably a screw. A biasing spring **88** allows the locking plate to frictionally keep the closing rod **32** from moving in the direction that would increase the distance between the sliding plate **20** and the fixed plate **24** unless the end of the locking plate **82** opposite from the nose **84** is depressed. If the locking plate **82** is depressed, the releasing springs **60**, **62** immediately move the sliding plate **20** into the open position.

The optional rod-locking assembly **80** can be enclosed by a case **90** having a button **92** for depressing the locking plate **82**. The button **92** can also be capable of being locked with a key so that the locking plate **82** cannot be depressed as illustrated in **FIGS. 14D and 14E.**

[043] The clamp **5** can optionally have a damping spring **98** placed over the closing rod **32** between the sliding plate **20** and the second opposing side **14**. The purpose of the damping spring **98** is to soften the impact of the sliding plate on the frame **10** after activation of the releasing spring **60**, **62**. However, it has been found that a damping spring **98** is not necessary.

[044] The clamp **5** can optionally have a front cover plate **36** and a back cover plate **38**. The front cover plate **36** and the back cover plate **38** can be connected to the clamp **5** by an eye hook screw and nut assembly **74** or other suitable fastening means. The clamp **5** can optionally have a knob **68** for a more comfortable grip. The clamp **5** can also have a mounting tube **66** connected to the frame **10** or other suitable location so that the clamp **5** can be mounted to another object like a wall or another frame.

[045] While the clamp **5** can be used in a variety of ways, the clamp **5** is particularly useful when used in combination with a platform **94**. As illustrated in **FIG. 15**, the clamp **5** can be connected to a second frame **96**, wherein the second frame **96** also has a platform **94** connected to it in a location below the clamp **5**. By using the clamp **5** in combination with a platform **94** a long barreled shotgun can be quickly stored by setting the base of the gun on the platform **94** when the clamp **5** is in the open or first position **56**, putting the barrel of the gun between the sliding plate **20** and the fixed plate **24**, and then moving the closing rod **32** to clamp the barrel. By doing so, the gun can be securely stored both quickly and easily with one hand placing the gun into position on the platform **94** and the other hand closing the clamp **5**. Other objects including bicycles, tennis rackets, shovels, rakes, shotguns, rifles, flashlights can be stored in a similar manner without damaging those objects in the clamping process. The clamp does not need to be connected to a "stand alone"

frame, like the second frame **96**, but the clamp **5** can also be mounted to a wall, table or other structure to provide a convenient and easy way to store and mount objects.

[046] Although the invention has been described in detail with reference to one or more particular preferred embodiments, persons possessing ordinary skill in the art to which this invention pertains will appreciate that various modifications and enhancements may be made without departing from the spirit and scope of the claims that follow.